Service Delivery Policy

MBTA Fiscal and Management Control Board
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Massachusetts Bay Transportation Authority

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Chapter 1: Introduction

Purpose

The Service Delivery Policy sets how the MBTA evaluates service quality and allocates transit service to meet the needs of the Massachusetts Bay region. It is consistent with the MBTA's enabling legislation and other external mandates, such as Title VI of the Civil Rights Act of 1964 (Title VI), and the Americans with Disabilities Act of 1990 (ADA). As such, the Service Delivery Policy:

- Establishes the aspects that define service availability and sets parameters for levels of provided service
- Establishes objectives that define the key performance characteristics of quality transit services
- Identifies quantifiable standards that are used to measure whether the MBTA's transit services achieve their objectives, within the context of federal, state, and local regulations
- Outlines a service planning process that applies the service standards in an objective, uniform, and accountable manner
- Sets the priorities for the service planning process by setting minimum levels and targets for the service standards
- Involves the public in the service planning process in a consistent, fair, and thorough manner

Background

This document is the 2017 update of the MBTA's Service Delivery Policy. The 2017 Service Delivery Policy takes advantage of the capabilities offered by newer technologies to collect and analyze data and to take the first steps towards creating standards from a passenger perspective. To this end, the MBTA worked with two committees to produce this document: 1) a policy advisory committee tasked with developing the service objectives, and 2) a technical advisory committee tasked with establishing standards, metrics, and thresholds designed to address the service objectives. These committees included staff from the MBTA, the Massachusetts Department of Transportation (MassDOT), and the Central Transportation Planning Staff (CTPS), along with members of academia, and various planning and advocacy groups. In addition, the MBTA engaged members of the public through a series of workshops throughout the region, via an online survey, and through public meetings.

This policy is intended to be updated regularly as the MBTA expands its ability to collect and analyze data, build out metrics, and define service parameters and targets. In addition, as priorities for service change, this policy can be updated to reflect these new priorities. Future updates will have a public input component and will be adopted by the MBTA governing board.

Document Structure

Chapter 2 lays out the service *objectives*. The service objectives include service availability and service quality. Service availability objectives describe where, when, and how often service is available to residents of the service area, and the ADA accessibility of the MBTA network. Service quality objectives describe the quality of the delivered service, from a passenger perspective whenever possible.

Since the MBTA offers a number of different types of service that play different roles in the overall network, and services also vary by time period during the service day, Chapter 2 also defines each type of service provided by the MBTA and the time periods of the service day.

Chapter 3 sets the quantifiable *standards* used to measure the objectives. These standards are divided into two categories: service planning standards used in the service planning process to evaluate and allocate service, and accessibility standards that fall outside the service planning process. The service planning standards will be evaluated in the Service Monitoring portion of the MBTA Title VI Program.

The standards for accessibility that fall outside the service planning process are set within the context of the ADA. These standards are used to inform capital and operating decisions outside of the service planning process.

Each standard has a number of components. The *definition* describes what conditions are considered passing for that standard. Within a single standard, the definition changes depending on the type of service or time period. The pass/fail condition is measured at different levels of aggregation depending on the standard. For example, whether a bus is considered on-time is measured at each time point on the route.

All standards are designed in the positive direction, so 100% would be perfect performance. This means improvement is always measured by increasing the percentage. Depending on the standard, performance can be measured at the route level, at the mode level, or for the entire network.

Each standard has a target. The targets provide a medium term goal for improving service; targets can be updated on a yearly basis as progress is made.

In addition the bus service planning standards have a *minimum;* since service planning requires trade-offs between standards the minimums are used to set priorities. If performance at a route or mode level falls below the minimum level on a standard, that

standard becomes a priority to address in the service planning process as appropriate. This document includes the 2016 performance on each of the standards to provide context for the minimums and targets.

In addition, Chapter 3 describes the methodology the MBTA uses to assess the cost-benefit ratio of bus routes. This metric is used to identify bus routes that are providing a high value for their cost and those providing a low value for their cost. This allows the MBTA to understand the characteristics of high-performing routes to emulate, and identify changes to modify or otherwise improve low-performing routes.

Chapter 4 lays out the service planning process. It includes the quarterly changes, the rolling service plan process and the annual gap analysis. Within the rolling service planning process Chapter 4 describes how the service standard minimums and targets are used to prioritize service changes.

The appendices provide additional information used to calculate the standards. Appendix D summarizes the standards and the targets, minimums, and 2016 performance levels.

Chapter 2: Services and Service Objectives

Service Objectives

The MBTA, in collaboration with stakeholders and passengers, identified the following service objectives representing the most important characteristics of a high-quality transit system. These objectives also address the requirements of the MBTA's enabling legislation.

Service Availability (Convenience)

People should be able to use the MBTA to travel throughout the service area at convenient times and frequencies.

Accessibility
As many people as possible should be able to use the entire system and all of the MBTA's services regardless of their abilities.

The MBTA will comply with ADA precepts to ensure that its services are accessible to the extent possible.

Reliability
The MBTA should operate the services it schedules.

Passengers should experience consistent headways on frequent services and on-time performance on infrequent services. Passengers should not experience excessive wait times.

Comfort
Passengers should have a reasonable amount of personal space during their trips.

Communication
Passengers should receive accurate and relevant information about the services they use in languages consistent with the MBTA's Language Access Plan (LAP) in a timely manner and in alternative formats if requested.

Safety and Security
Passengers should experience safe and secure traveling conditions.

The MBTA should operate and maintain the system with the highest regard for the safety of passengers and employees.

Rider Satisfaction
Passengers should be satisfied with the service the MBTA provides.

Environmental Benefit
The MBTA should reduce its own environmental impact and should offer passengers a

service experience that supports travel choices other than single-occupancy vehicle trips.

Service Standards

For the service planning and accessibility objectives cited above, the MBTA established quantifiable standards that allow the MBTA to evaluate the performance of its services relative to each objective. Not all objectives are addressed in this Service Delivery Policy.

Specifically, the standards for safety and security are set with the MBTA's state and federal regulatory partners and are monitored and reported outside of this policy. The standards for communication are currently being developed and will be adopted at a later date.

The MBTA monitors rider satisfaction through a monthly customer opinion panel and other survey efforts. These results are reported on the MBTA Performance Dashboard monthly. The MBTA Environmental and Energy Department monitors the MBTA's environmental impact, including measures of greenhouse gas emissions per unlinked passenger trip and greenhouse gas displacement. These results are published in the MBTA Sustainability Report.

Table 1 summarizes the remaining service objectives and standards, what types of tools the MBTA has to improve them, and the Title VI implications; Chapter 3 discusses the service standards in detail.

Table 1: MBTA Service Objectives and Standards

Service Objective	Standards	Tools to address	Title VI Implication
Service Availability	Span of service Frequency of service Coverage: • Coverage of the service area • High-frequency service coverage for high-density areas • Coverage for low-income households	Service planning	Service monitoring and equity analyses for major service changes
Reliability	Schedule adherence Passenger wait time Service operated	Service planning, operational changes, municipal partnerships	Service monitoring
Comfort	Vehicle load	Service planning, operational changes, municipal partnerships	Service monitoring
Accessibility	Platform accessibility Vehicle accessibility	Capital budget, operational changes	Elevators included in service monitoring

Source: MBTA.

Services

The MBTA operates a comprehensive set of transit services. This policy addresses all of the MBTA's fixed-route services including bus, light rail, heavy rail, commuter rail, and boat, as described below[1].

Contracts with the service providers who operate The RIDE, the MBTA's paratransit service, include performance standards. Appendix C: The RIDE Service lists these requirements.

Bus

For the purposes of this policy, "bus" includes all rubber-tire vehicles regardless of the vehicle's power source. The MBTA operates several different types of bus services including:

Local Bus Routes provide full weekday service that extends beyond the morning and afternoon peak travel hours. Local routes are not necessarily designed to target any specific trip purpose. In general, stops on local routes are closely spaced, and pick-ups/drop-offs are allowed at all stops across the entire route; however, some local routes, such as the crosstown routes, operate with limited stops.

Key Bus Routes are similar to local routes, but generally operate longer hours and at higher frequencies to meet high levels of passenger demand in high-density travel corridors. Key bus routes are identified in maps and schedules.

Silver Line routes meet or exceed the characteristics of key bus routes and operate on dedicated right-of-ways for a portion of the routes.

In concert with light rail and heavy rail (discussed below), the key bus routes ensure geographic coverage of frequent service in the densest areas of Greater Boston's core, and offer intermodal connections to other MBTA services that extend throughout the region.

Commuter Bus Routes provide a limited number of peak-direction trips during periods when commuters would use the services. Commuter routes include **express bus routes**, which are identified as such in schedules and are characterized by a limited number of stops that are provided only near the ends of the routes. Some stops may be drop-off or pick-up only. Some commuter routes include closely spaced stops.

[1] Service standards also apply to all contracted services. The MBTA will take steps in all future contracts to ensure the collection of all data necessary to calculate the standards.

Community Bus Routes provide weekday service between the morning and afternoon peak hours primarily for non-work travel. Stops are closely spaced (where practical) and pick-ups/drop-offs are allowed at all stops across the entire route.

Supplemental Bus Routes either provide limited service early in the morning or are designed to support other bus routes.

Tables showing the route type for each route is in the attached Appendix A: Route Types, which is updated as changes to route designations occur.

Rapid Transit

The MBTA's rapid transit system includes its heavy rail and light rail services, described below. For the purposes of this policy the Silver Line is evaluated on Key Bus Route standards.

Light Rail

The MBTA's primary light rail system, the Green Line, provides local service in outlying areas via its surface operations and core subway services in the heart of the city. In addition, the MBTA operates the Mattapan High Speed Line, which serves as a Red Line extension from Ashmont Station to Mattapan Station via light rail.

Heavy Rail

The MBTA operates three heavy rail lines—the Red Line, the Blue Line, and the Orange Line—that provide core subway services.

Commuter Rail

The MBTA's commuter rail lines provide long-haul, primarily commuter-oriented services that link the outer portions of the region with Downtown Boston.

Boat

The MBTA provides Inner Harbor Ferry services for travel between destinations in Boston, and Commuter Boat services from the South Shore to Downtown Boston and Logan Airport.

The RIDE

The MBTA's paratransit program, The RIDE, is mandated under the ADA. It provides door-to-door, shared-ride transportation to eligible passengers who cannot use fixed-route all or some of the time because of a physical, cognitive or mental disability. The service area currently covers 58 cities and towns in and around Boston. The program provides ADA trips (trips with origins and destinations within three-quarter miles of a

fixed-route service) at one fare rate and non-ADA trips (trips with origins and destinations greater than three-quarter miles away from a fixed-route service or for same-day trip request) at a higher fare rate.

Time periods

The MBTA provides different levels of services depending on the time of day and days of the week. Table 2 provides the time periods for weekdays. Saturdays and Sundays are measured separately for most standards.

This time periods are designed for the purposes of bus service planning. Due to the different nature of the service Commuter Rail has different time periods. Its AM Peak includes all trains that arrive in their final Boston terminal between 6:00AM to 10:00AM and its PM Peak is all trains that originate in Boston and depart between 3:30PM and 7:00PM.

Table 2: MBTA Weekday Time Period Definitions

Time Period	Definition
Sunrise	3:00 AM – 5:59 AM
Early AM	6:00 AM – 6:59 AM
AM Peak	7:00 AM – 8:59 AM
Midday Base	9:00 AM – 1:29 PM
Midday School	1:30 PM – 3:59 PM
PM Peak	4:00 PM – 6:29 PM
Evening	6:30 PM – 9:59 PM
Late Evening	10:00 PM – 11:59 PM
Night	12:00 AM – 2:59 AM

Source: MBTA.

Chapter 3: Standards and Planning Tools

The service standards perform two important functions. First, they establish the acceptable levels of service that the MBTA must provide to achieve the service objectives. Second, the standards provide a framework for measuring the performance of MBTA services as a part of the service planning process, which is discussed in Chapter 4. Through the service planning process, performance data collected on MBTA services are compared against the service standards to determine whether individual existing services perform at acceptable levels and to evaluate the need for service changes. The service planning process also uses the service standards to prioritize and reallocate resources within the system.

There are a multitude of factors that can impact the performance of the MBTA services. Service planning is one of the tools the MBTA uses to improve performance. In addition, the MBTA works with our municipal partners to address factors that are in our mutual control.

The service planning process is designed to use the service standards to help ensure a cost-effective allocation of service and basic availability throughout the region within the overall amount of operations funding, which is determined through the annual budget process. This policy also provides a service planning tool to measure the cost-efficiency of bus routes. In addition, the service planning process also documents the resource gap between meeting all of the service standards at the target levels and the performance of the operated service each year.

The progress towards the performance targets is reported in the Massachusetts Department of Transportation annual performance report *Tracker*. This allows the MBTA to track progress toward targets regularly and revisit them as necessary. All of the service standard targets and minimums are listed in Appendix D: Service Standard Targets. Appendix D also lists the time frame for all the reported 2016 performance data.

Some of these standards are evaluated over a relatively short period (for example, daily or quarterly), and others are evaluated when the MBTA considers modifying service. How often each standard is evaluated is listed in Table 14.

The following is a discussion of the MBTA service standards, in the context of the service objective to which each applies. These standards address the fixed-route modes as described in Chapter 2.

Service Availability Standards

The availability standards define the levels of service that will provide meaningful access to the transit system, in terms of the length of the service day (span of service)

and the frequency of service. Each of these standards varies by mode. In addition, the MBTA measures geographic access to the system using a coverage standard with three components.

Many of the service standards differ depending on the time of day the service is offered. Table 2 defines the weekday service time periods. Because weekend travel patterns differ from weekdays, specific periods are not defined for Saturdays and Sundays.

Span of Service

Span of service refers to the hours during which service is available. The MBTA has established span of service standards that define the expected hours that any given service will operate. This provides passengers with the confidence that particular types of services will be available throughout the day. The MBTA may extend a service's span beyond the expected hours in response to customer demand.

The span of service standards, stated in Table 3 below, vary by mode and by day of the week, reflecting the predominant travel flows in the region. The standards require that the first trip in the morning in the peak direction of travel must arrive in downtown Boston, or the route terminal if the route does not serve downtown Boston, at or before the beginning span of service time (for example, 7:00 AM for local bus). At the end of the service day, the last trip in the evening in the peak direction of travel must depart downtown Boston, or the route terminal if the route does not serve downtown Boston, at or after the ending span of service time (for example, 7:00 PM for local bus).

For example, the Orange Line serves downtown Boston, so the standard requires that the first northbound and southbound trips must each reach Downtown Crossing by 6:00 AM. On the other hand, Key Bus Route 66 does not serve downtown Boston, and more passengers travel towards Harvard in the AM Peak period, so the standard requires that the first trip in the morning must arrive at Harvard before 6:00 AM.

If Table 3 does not specify an expected span of service for a mode or time period, then there is no respective standard. Service hours are set based on demand.

Table 3: Span of Service

Mode	Day	Expected Span of Service
Bus		
Local	Weekday	7:00 AM – 7:00 PM
	Saturday[1]	8:00 AM – 6:30 PM
	Sunday[1]	10:00 AM – 6:30 PM
Community	Weekday	10:00 AM – 4:00 PM
Commuter	Weekday	7:00 AM – 9:00 AM 4:00 PM – 6:30 PM
Supplemental	Weekday	No minimum span
Key Bus Routes	Weekday	6:00 AM – midnight
	Saturday	6:00 AM – midnight
	Sunday	7:00 AM – midnight
Heavy Rail	Weekday	6:00 AM – midnight
	Saturday	6:00 AM – midnight
	Sunday	7:00 AM – midnight
Light Rail	Weekday	6:00 AM – midnight
	Saturday	6:00 AM – midnight
	Sunday	7:00 AM – midnight
Commuter Rail	Weekday	7:00 AM – 10:00 PM
	Saturday	8:00 AM – 6:30 PM
Boat	Weekday	7:00 AM – 6:30 PM
	Saturday[2]	8:00 AM – 6:30 PM

[1] This is a standard for high-density areas. There is no span standard for low-density areas on weekends.

[2] Memorial Day–Columbus Day

Note: The RIDE generally operates from 5:00 AM to 1:00 AM. The MBTA provides extended hours for trips starting and ending within 0.75 miles of a fixed-route service that operates outside of these hours.

Source: MBTA.

During the service planning process the MBTA will evaluate vehicle loads at the beginning and end of the service day to determine whether expanding the span of service is warranted.

The MBTA's performance on this measure is weighted by ridership; passenger trips taken on services that operate at least during the expected span are counted as "passing", while trips taken on services that operate less than the expected span are counted as "failing". This weighting prioritizes meeting the expected span of service on routes and services with high ridership. Performance is evaluated for each mode.

Table 4: Span of Service Targets and Performance

Standard	Minimum	Target	2016 weekday performance
Bus	90%	95%	93%
Heavy Rail	—	100%	100%
Light Rail	—	100%	100%
Commuter Rail	—	100%	100%
Boat	—	100%	100%

Bus performance data from Spring 2016. Other data from Dec. 2016.
Source: MBTA.

Frequency of Service

To maintain access to the transportation network within a reasonable waiting time, the MBTA established expected frequency of service levels for each mode, by time of day. On less heavily-traveled services, these expected levels set the standard for the frequency of service, regardless of customer demand. Frequency of service standards are measured using either headway (minutes between trips) or frequency (trips per time period).

If Table 5 does not specify an expected frequency for a mode or time period, then there is no respective standard. Frequencies for these services are set based on demand.

Table 5: Service Frequency

Mode	Weekday Time Periods	Expected Frequency or Headway
Bus	AM and PM Peak	Every 30 minutes
Local, Community	All other periods	Every 60 minutes
	Saturday and Sunday	Every 60 minutes
Commuter	AM Peak	3 trips in the peak direction
	PM Peak	3 trips in the peak direction
Key Bus Routes	AM and PM Peak	Every 10 minutes
	Early AM and Midday Base/School	Every 15 minutes
	Evening and Late Evening	Every 20 minutes
	Saturday and Sunday	Every 20 minutes
Rapid Transit	AM and PM Peak	Every 10 minutes
	All other periods	Every 15 minutes
	Saturday and Sunday	Every 15 minutes
Commuter Rail	AM Peak	3 trips in peak direction
	PM Peak	4 trips in peak direction
	All other periods	Every 3 hours in each direction
	Saturday	Every 3 hours in each direction
Boat	AM and PM Peak	3 trips in the peak direction
	Off-Peak periods	Every 3 hours

Note: There is no frequency standard during the Sunrise or Night times or for supplemental bus service. AM Peak and PM Peak are defined differently for Commuter Rail.
Source: MBTA.

The frequency of service levels may not be sufficient to meet passenger demand on heavily used services or on services with peak ridership that is outside the traditional peak hours. When load levels indicate that additional service is warranted on a particular route, as defined in the crowding standard, the MBTA may increase that service's frequency or provide larger vehicles to provide sufficient capacity to accommodate passenger demand.

MBTA's performance on this measure is weighted by ridership in each time period; passenger trips taken on services that operate at least at the expected frequency are counted as "passing", while trips taken on services that operate less than at the expected frequency are counted as "failing". This weighting prioritizes meeting the expected frequency at peak periods and on routes and services with high ridership. Performance is evaluated for each mode.

Table 6: Service Frequency Targets and Performance

Standard	Minimum	Target	2016 weekday performance
Bus	90%	95%	90%
Rapid Transit	—	100%	100%
Boat	—	100%	100%

Bus performance data from Spring 2016. Other data from Dec. 2016.
Note: This version of the Service Delivery Policy has focused on bus service planning; future versions will address Commuter Rail service planning once more granular ridership data is available.
Source: MBTA.

Coverage Standard

An important aspect of providing the region with adequate access to transit services is the system's geographic coverage. The MBTA recognizes that coverage means different things to different markets. To address these different groups, the MBTA measures coverage in three ways:

- Base Coverage
- Frequent Service in Dense Areas Coverage
- Low-income Household Coverage

Because of constraints such as topography and street network restrictions, it is not always possible to achieve uniform geographic coverage. In addition, demand for transit does not exist uniformly across the service area; high population density and low-income households create higher demand and need for transit access.

The MBTA prioritizes high frequency service in high density area and service to areas with high proportions of low-income households, while maintaining an acceptable level of base coverage. For the coverage standard, the MBTA will set a minimum for the base coverage and targets for the coverage of frequent service in dense areas and coverage of low-income households[2].

The MBTA will monitor the effect of proposed service modifications on all three components of the coverage standard as part of its service planning process, described in Chapter 4.

[2] The base coverage will be evaluated as part of the Title VI Service Monitoring.

In order to calculate the coverage the MBTA uses walkshed distances to bus stops, rail stations, or boat docks. This means the half-mile distance is calculated based on the walking distance using the street network instead of a straight line distance that is usually impossible for pedestrians to travel. This means that another way to increase the coverage is by changes to the street network to shorten walking distances.

Base Coverage

People expect the MBTA to provide a basic level of coverage throughout its service area. Some of this service may be relatively infrequent for some or all of the service day; but people throughout the service area expect and should have a minimum level of service.

The MBTA will measure the:

> *Percent of the population that lives no more than 0.50 miles from a bus stop, rapid transit station, commuter rail station, or boat dock in the municipalities in the MBTA's service area, excluding municipalities that are members of a regional transit authority (RTA).*

Supplemental bus routes will not be counted in the base coverage calculations.

Frequent Service in Dense Areas

Beyond a basic level of service throughout the entire service area, there are dense, urban areas where people expect frequent service. Within these urban areas, people can be reasonably sure that if they want to make a trip, they will have convenient access to frequent service.

In this section, frequent transit service is defined to include all bus stops along key bus routes, all rapid transit stations, and any bus stop that receives frequent service during its span of service.

A bus stop in the MBTA bus network is considered to receive frequent service if the average headway at that bus stop during the hours when any route serves the bus stop is less than a headway of:

- 15 minutes on weekdays (set to the expected headway for key bus routes during the midday base time period) *and*
- 20 minutes on Saturdays and Sundays (set to the expected headway for key bus routes on Saturdays and Sundays)

A bus stop can only be considered to receive frequent service if the span of service of all routes serving the bus stop meets or exceeds the span of service definitions for key bus routes.

The MBTA will measure the:

> *Percent of the population that lives no more than 0.50 miles away from high-frequency service in the census block groups within the MBTA's service area that have densities greater than or equal to 7,000 people per square-mile, excluding census block groups within municipalities that are members of an RTA.*

The goal of this standard is to identify mostly contiguous, dense areas in the MBTA's service area that would support sufficiently effective frequent bus services. Choosing census block group densities below approximately 7,000 people per square mile creates many noncontiguous high-density "islands" throughout the MBTA's service area. At approximately 7,000 people per square mile, few high density islands remain.

Low-income Households

To reflect the importance of transit service to people who live in lower income households, the MBTA will measure the percentage of low-income households in its service areas that are located near transit.

The MBTA will measure the:

> *Percent of the low-income households that are located no more than 0.50 miles away from any stop or station in the municipalities in the MBTA's service area, excluding municipalities that are members of an RTA.*

For all three components of the coverage standard, the MBTA will use the smallest census-based geography that is available and reliable. The distance to a transit stop will be measuring using walking distances.

Summary of Coverage Standard

Table 7: Summary of Coverage Standards

	Numerator	Denominator	Minimum/ Target	2016 performance
Base	Population living in census block groups within 0.50 miles of transit	Population of the MBTA service area	Minimum 75%	80%
Frequent service in dense areas	Population living no more than 0.50 miles away from high-frequency service in the census block groups that have densities greater than or equal to 7,000 people per square-mile	Population living in the census block groups that have densities greater than or equal to 7,000 people per square-mile	Target 85%	80%
Low-income households	Number of low-income households located in census block groups within 0.50 miles of transit	Households in the MBTA service area	Target 85%	83%

Performance data from Fall 2016.
Note: All populations include people living in municipalities in the MBTA's service area, excluding people living in municipalities that are members of an RTA.
Source: MBTA.

Accessibility Standards

Platform Accessibility Standard

If elevators are not available to people who need or want to use them, they may not be able to gain access to MBTA services. The MBTA's goal is for people to be able to access the platforms in each station at all times service is offered.

The MBTA will measure the:

Percent of the total platform-hours[3] that are accessible.

The MBTA will measure this separately for rapid transit stations, commuter rail stations, and boat docks; and it will continue to measure progress towards this standard. The minimum will always be set as the current annual performance.

Vehicle Accessibility Standard

The MBTA should provide at least one ADA-compliant vehicle on each trip it operates. The MBTA will measure the:

Percent of trips that the MBTA provides with at least one ADA-compliant vehicle.

A trip on Commuter Rail is considered compliant if at least one ADA-compliant car/coach in the trainset matches the location of each high-level platform at stations served by the trip. ADA-compliant Commuter Rail coaches must include ADA-compliant restrooms. Trips on the Green Line are considered noncompliant if none of the vehicles in a train set is ADA-compliant. Bus trips are not measured since ramps can be deployed manually. Heavy rail and boat trips are covered in the platform standard.

The minimum will always be set as the current annual performance and the MBTA will continue to measure progress toward this standard.

Table 8: Accessibility Standards Targets and Performance

Standard	Minimum	Target	2016 performance	2016 data
Platform Accessibility (Rapid Transit stations)	92%	100%	92%	Apr 2015–Mar 2016
Vehicle Accessibility (Green Line)	98.6%	100%	98.6%	Jul 2015–Jun 2016

Rapid Transit stations, include gated Silver Line Waterfront stations, but exclude surface-level stops on Green and Silver lines.
Source: MBTA.

[3] One hour of service offered to trains traveling each direction at a station. For each hour of service, a station can provide two accessible platform-hours, one hour for trains traveling in each direction. Stations with multiple platforms serving multiple branches or lines can have more than two accessible platform-hours per hour.

Reliability Service Standards

Reliability standards vary by mode and provide tools to evaluate the on-time performance of individual MBTA lines and routes. Reliability standards also vary based on frequency of service; passengers using high-frequency services generally are more interested in regular vehicle arrivals than in strict adherence to published timetables, whereas passengers who use less-frequent services expect arrivals/departures to occur as published.

Bus Reliability

Bus Timepoint Tests

To determine whether a bus is on time at an individual timepoint, such as the beginning of a route, end of a route, or a scheduled point in between, the MBTA uses two different tests based on the scheduled frequency of the service:

> **Scheduled-Departure Service:** A trip is considered to provide scheduled-departure service when it operates with a headway longer than 15 minutes. For scheduled-departure services, passengers generally time their arrivals at bus stops to correspond with the specific published departure times.
>
> **Frequent Service:** A trip is considered to provide frequent service when it operates with a headway of 15 minutes or shorter. For frequent service, passengers can arrive at a stop without looking at a schedule and expect a reasonably short wait. Key bus routes, whose passengers use the services as if they were frequent services despite occasional longer than 15 minute headways, are always evaluated using the frequent service definition even when their headways exceed 15 minutes.

Routes other than key bus routes might operate entirely with frequent service, entirely with scheduled-departure service, or with a combination of both throughout the day. Because any given route may have both types of service, each trip is considered individually to determine whether it represents scheduled-departure service or frequent service, and each timepoint crossed on that trip is measured accordingly. Therefore, there are two separate timepoint tests:

On Time Test for Scheduled-Departure Timepoints

To be considered on time at a timepoint, any trip evaluated using the scheduled-departure standard must meet one of the conditions cited below.

> **Origin timepoint:** The trip must *depart* its origin timepoint between 0 minutes before and 3 minutes after its scheduled departure time.
>
> **Mid-route timepoint:** The trip must *leave* the mid-route timepoint(s) between 1 minute before and 6 minutes after its scheduled departure time.

Destination timepoint: The trip must *arrive* at its destination timepoint no later than 5 minutes after its scheduled arrival time.

This standard allows vehicles to arrive early at their mid-route timepoints and at their destinations. The MBTA's communication standards will assesses the accuracy and timeliness of vehicle arrival predictions in order to make sure passengers have information on early mid-route arrivals.

On-Time Test for Timepoints on Frequent Services

Origin or mid-route timepoint: To be considered on time at a timepoint, a trip evaluated using the frequent service standard must leave its origin timepoint or mid-route timepoint no later than the scheduled headway plus 3 minutes.

For example, if “trip A” is scheduled to depart at 7:00 AM and the route’s next trip, “trip B,” is scheduled to depart at 7:07 AM, trip B has a 7-minute scheduled headway. Therefore, trip B must depart no more than 10 minutes (3 minutes more than the scheduled headway) after trip A actually depart for the origin timepoint to be considered on time. If trip A departs at 7:05 (5 minutes after its scheduled departure time), trip B can depart no later than 7:15 (10 minutes after trip A’s actual departure) to be considered on time.

Destination: The actual run time from the origin timepoint to the destination timepoint must be no more than 120 percent of the scheduled run time for the trip to be considered on time at the destination timepoint.

Treatment of Dropped Trips in the Bus Reliability Standard

The MBTA does not currently track dropped bus trips on a trip-by-trip basis. If the reliability data for a trip is not available, the MBTA excludes the trip from the calculation—the trip is removed from the total number of timepoints that are on time (or not on time) and from the total number of timepoints. In the case of the frequent service test, this means that the MBTA excludes headways preceding and following a trip with missing data from the calculation.

In the future, when the MBTA is able to track dropped trips on a trip-by-trip basis:

In the scheduled-departure test, dropped trips will count as failures for all timepoint crossings.

In the frequent service test, a dropped trip does not count towards the number of timepoint crossings, and the headway of the next operated trip, following the dropped trip(s), is measured from the previous operated trip.

Bus Route Test

Bus reliability is calculated as the:

Percent of each route's timepoints that meet the above definitions.

The numerator is the number of time points that met the above definitions and the denominator is the number of total time points.

Table 9: Summary of the Bus Reliability Timepoint and Route Tests

	Origin	Mid-route	Destination
Scheduled Departures (Headways > 15 min.)			
Standard	Depart 0 min. early to 3 min. late	Depart 1 min. early to 6 min. late	Arrive no more than 5 min. late
Arrival Standard	—	—	A ≤ 5.0
Departure Standard	0.0 ≤ D ≤ 3.0	-1.0 ≤ D ≤ 6.0	—
Frequent Service Departures (Headways ≤ 15 min.)			
Standard	Depart no later than the scheduled headway plus 3 minutes		Actual run time is no more than 120% of the scheduled running time
Standard	$h_a \leq h_s + 3$ *minutes*		$t_a \leq 1.2 \times t_s$

Source: MBTA.

Where:

$A = arrival\ time$
$D = departure\ time$
$h_s = schedule\ headway$
$h_a = actual\ headway$
$t_s = scheduled\ running\ time$
$t_a = actual\ running\ time$

Exceptions:

The first trip of the day on *each* route, which does not have a leading headway, is considered a scheduled-departure trip. All key bus routes are considered frequent services at all times, except for their first trip of the day.

Heavy and Light Rail Reliability

Passenger Wait Time

As with frequent bus services, passengers on light rail and heavy rail do not rely on printed schedules; rather, they expect trains to arrive at consistent headways. Therefore, schedule adherence for light rail and heavy rail is measured based on the proportion of a line's passengers who wait the scheduled headway, or less, for a train to arrive.

The passenger wait time standard is measured based on the:

> *Percent of passengers traveling in each time period that wait the scheduled headway, or less, at each station.*

For people traveling in the trunk section of the Green Line, the headway is defined as 3 minutes.

On-Time Test for Stations on the Mattapan Line

The Mattapan Line is currently separate from the other light rail lines because the systems do not exist to evaluate the line using the passenger wait and travel time standards[4]. The Mattapan Line is evaluated using the On-Time Test for Timepoints on Frequent Services standard, used to measure the on-time performance of frequent bus services, with station departures corresponding to timepoint crossings.

The Mattapan Line reliability is measured by the:

> *Percent of all station departures (or arrivals for terminal stations) on the Mattapan Line over the entire service day that pass their on-time tests.*

Commuter Rail Reliability

Commuter rail passengers expect to arrive at their destination station at the time posted in the schedule. The MBTA will measure the number of trains that arrive at the destination terminal no later than 5 minutes after the time published in the schedule.

Commuter rail reliability is measured as the:

> *Percent of trains that arrive at their destination station on time.*

[4] Once the technology systems necessary to evaluate Mattapan Trolley service is finished being implemented, it will switch over to the same standard as the Light and Heavy Rail.

The MBTA and its commuter rail operator are working to develop passenger weighted measures for commuter rail reliability.

Boat Reliability

Boat passengers expect to arrive at their destination dock at the time posted in the schedule. The MBTA will measure the number of boats that arrive at the destination terminal no later than 5 minutes after the time published in the schedule.

Boat reliability is measured as the:

> *Percent of boats that arrive at their destination dock on time.*

Service Operated Standard

The MBTA intends to operate all of the service it schedules. A multitude of factors, including equipment failure, lack of personnel, and unforeseen delays like medical and police emergencies, can sometimes prevent the MBTA from operating scheduled service.

The MBTA will measure the:

> *Percent of scheduled service that is actually provided for each bus route, light rail line, heavy rail line, commuter rail line, and boat route.*

Planned heavy, light, and commuter rail outages where the MBTA offers substitute service do not count against this standard. For bus this standard will also be examined at the route level to determine if some bus routes have higher dropped trips rates, so steps can be taken to address significant imbalances.

Table 10: Reliability Standards and Performance

Standard	Minimum	Target	2016 performance	2016 data
Bus Reliability (non-Key)	70%	75%	65%	Mar–Dec 2016
Key Bus	75%	80%		
Rapid Transit Passenger Wait Times	—	90%	89%	Mar–Dec 2016
Commuter Rail Reliability	Contract requires 92% adjusted		93.8% (adjusted)	Jan–Dec 2016
Boat Reliability	—	99%	98%	Jul 2015–Jun 2016
Bus Service Operated	—	99.5%	98.5%	Jul 2015–Jun 2016
Light Rail Service Operated	—	99.5%	96.5%**	March-December 2016
Heavy Rail Service Operated	—	99.5%	99.1%**	March-December 2016
Commuter Rail Service Operated	Contract sets fines for canceled service		99.8%	Jan–Dec 2016

** Data subject to change with improvements in data collection methodologies
Source: MBTA.

Comfort Standards

Passenger comfort is influenced by the number of people on the vehicle and whether or not a seat is available to each rider for all or most of the trip. Passenger comfort

standards, which vary by mode and time of day, establish the maximum number of passengers per vehicle to provide a safe and comfortable ride.

Passenger Comfort Standards

As indicated in the frequency of service standard, the level of service provided by the MBTA is primarily a function of demand, as demonstrated by the number of passengers using the service at different times during the day. On weekends and some weekday periods, most MBTA services operate with sufficient frequency to provide every passenger with a seat. However, at the heaviest weekday travel times or locations, some passengers will need to stand.

During periods when some passengers will be standing, the MBTA strives to provide sufficient service so that people are reasonably comfortable. The purpose of the passenger comfort standard is to define the levels of crowding that are acceptable by mode and time period. The periods used by the MBTA for all modes, for both frequency of service and vehicle load standards, are defined earlier in this chapter (see Table 2).

There are a number of different types of vehicles in the MBTA's fleets at any given time, and the fleets change over time. Hence, the actual seating capacity and maximum number of passengers allowed by the comfort standards for each mode changes periodically. These load standards are included in Appendix B: Vehicle Load, which is updated as the fleets change.

Bus

The MBTA will measure the passenger hours of travel experienced by comfortable bus passengers during each time period. The maximum comfortable load is expressed as a ratio of the number of passengers on the vehicle to the number of seats on the vehicle. The maximum comfortable loads are set based on Department of Public Utility (DPU) Regulation 220 CMR 155.02 (26), which states "passengers in excess of 40 percent above the seating capacity of a motor bus shall not habitually be carried… ."

High-volume Time Periods

The maximum comfortable passenger-to-seat ratio for high-volume travel periods is 140%. At loads of 140% or less of seated capacity, all passengers are considered comfortable. No passengers are considered comfortable when the vehicle load exceeds 140% of seated capacity.

Low-volume Time Periods

The maximum comfortable passenger-to-seat ratio for lower-volume travel periods is 125%. At loads up to 125% of seated capacity, all passengers are considered comfortable; above 125% and up to 140% of seated capacity, seated passengers are

considered comfortable; and no passengers are considered comfortable when the vehicle load exceeds 140% of seated capacity.

Appendix B: Vehicle Load contains the number of seats and the loading thresholds for each vehicle type.

The MBTA will measure the:

> *Percent of passenger travel time experienced in comfortable conditions[5].*

Table 11: Passenger Comfort Standard Targets and Performance

Standard	Minimum	Target	2015 performance
Bus Passenger Minutes in Comfortable Conditions	92%	96%	94%

Data from average weekday September 1- December 14, 2015
Source: MBTA.

Heavy and Light Rail

The MBTA currently lacks the data to accurately measure passenger loads on heavy and light rail vehicles. As of 2016, the MBTA is working to procure heavy and light rail vehicles that have Automatic Passenger Counters (APCs) installed. This will allow for a standard similar to bus that measures the passenger time in crowded conditions.

In the meantime, the MBTA is developing a capacity metric for heavy and light rail that compares the number of people entering stations over 30 minute time periods to the capacity of the number of trains operated in that time period. This capacity metric will identify segments in the system that need additional service to address overcrowding.

Commuter Rail

The MBTA currently lacks the data to accurately measure the passenger loads on individual commuter rail coaches. The MBTA and its commuter rail operator are working to collect this type of data to allow for better planning. The contract does set expectations on the number of seats the operator should provide based on expected loads.

[5] For bus routes without enough data to model the passenger time in comfortable conditions, the proxy variable of maximum load will be used for all service planning decisions.

Boat

Federal laws prohibit boats from carrying more than their certified capacity—boats will leave people behind before they exceed their capacity. The MBTA does not have crowding-based comfort standards for its boat services. The MBTA will monitor if passengers are being regularly left-behind to determine if additional capacity is necessary.

Service Planning Tools

In addition to service standards, the MBTA can and should use diagnostic tools as part of its service planning process. For example, the MBTA needs to be able to evaluate the cost-effectiveness of its bus routes, even without establishing a cost standard. This Bus Route Cost-Benefit Ratio Tool will not be used to direct service cuts, but instead will be used to determine the cost-efficiency of the service provided and to identify service changes to improve performance.

Bus Route Cost-Benefit Ratio

Services may be valuable for different reasons; while carrying many passengers is an important characteristic, it is not the only factor that determines whether a service is effective or valuable. The MBTA considers three primary characteristics, or aspects, when evaluating whether a service is valuable to the system:

- **Ridership:** The number of people who use a service.
- **Transit Dependent Passengers:** The percentage of transit dependent people who use the service.
- **Value to Network:** Whether a service provides access to the greater network and the region. Value to the Network is composed of three characteristics:

  Catchment Area: The number of people uniquely covered by each service.

  Destination Coverage: The number of jobs and destinations sited near each service.

  Transferring Passengers: The share of passengers who transfer to other services—these passengers contribute to the service effectiveness of other routes and modes.

Each bus route receives a benefit score for each of these aspects. Each aspect (Ridership, Transit Dependent Passengers, and Value to the Network) may be weighted depending on priorities set by the governing board. Table 12 has the current weights.

Table 12: Weighting of Components of Bus Route Benefit

Weight	Ridership	Transit Dependent	Value to the Network
	70%	15%	15%

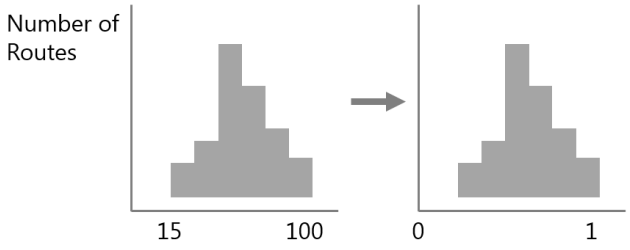
After summing the scores for each aspect, the score is divided by the net operating cost to develop a cost-benefit ratio. A cost-allocation formula uses a route's peak and off-peak service hours and the total miles of service provided to calculate the route's operating cost.

Routes in the 10th percentile or lower will be reviewed to determine what actions could be taken to improve the route's performance or to determine whether the route is a worthy use of resources. In addition, routes that perform above the 90th percentile will be analyzed to determine the characteristics of high performing routes.

The Methodology for Benefit

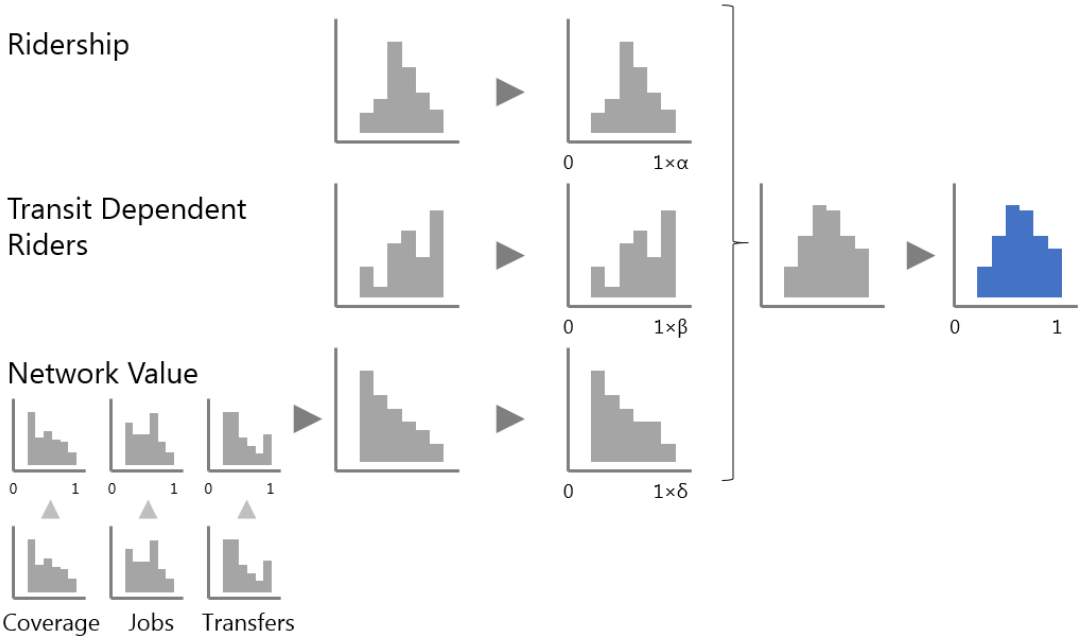
The MBTA combines the scores for each aspect to develop a single value for each service. Since the aspects have significantly different orders of magnitude[6], they need to be standardized before they can be combined.

To scale the values to comparable values, the MBTA scales each aspects distribution to values between 0 and 1:



Within the Value to the Network portion of this equation, the values are added together. The scores for Value to the Network are renormalized to be combined with Ridership and Transit Dependent Passengers metrics. When combining the three top-level aspects, first the weights are applied to each aspect, then the values are added and renormalized.

[6] Ridership per route varies between 50 and 15,000 trips per day. Transit dependent passengers and transferring passengers vary between 0 and 100%. Catchment area and destination coverage can be in the tens of thousands.



For example:

Table 13: Evaluation of an Example Route

Metric	Value	Normalized	×	Weight	Final	
Ridership	13,000	**0.95**	×	**4**	**3.80**	
Transit Dependent Passengers	20%	**0.25**	×	**2**	**0.30**	
Value to the Network	1.10	**0.60**	×	**1**	**0.60**	
Catchment Area	2,000 people	0.10				
Destination Coverage	10,000 jobs	0.60				
Transferring Passengers	10%	0.40				
Total Score	*1.10 (0.10+0.60+0.40)*	*0.60*				
Productivity Score					***4.70***	
Normalized Score					***0.68***	

Frequency of Analysis

The MBTA measures all of the standards at different frequencies depending on the availability of data and the use of the specific metric.

Table 14 shows often each of the standards are measured.

Table 14: Frequency at which Each Standard is Typically Measured

Standard	Daily	Quarterly	Annual/ Service Plan
Availability			
Span of service	☐	■	■
Frequency	☐	■	■
Coverage	☐	■	■
Accessibility			
Platform accessibility	☐	■	■
Vehicle accessibility	☐	■	■
Reliability			
Bus and all rail reliability	■	■	■
Boat reliability	☐	■	■
Service operated	☐	■	■
Comfort			
Crowded passenger minutes	☐	■	■
Service Planning Metric			
Bus cost benefit ratio	☐	☐	■

Source: MBTA.

Chapter 4: Service Planning Process

The MBTA regularly evaluates performance of its services and recommends and implements service changes through the service planning process. The service planning process strives to ensure that the MBTA uses resources in the most effective manner by developing strategies to improve performance and/or to allocate service within the system. Additionally, the process also identifies the gap between actual service levels and the targets set in this policy. The service planning process includes system-wide quarterly changes, ongoing rolling Service Plan changes, and an annual evaluation to inform the MBTA's budget process.

This chapter focuses on planning for bus and subway modes; many of the processes described in this chapter may be used in planning for commuter rail and boat modes.

Service Planning Process

The service planning process takes place on two levels. One is the quarterly evaluation and implementation of incremental service changes. The other is an annual review of system performance along with rolling service plans focused on development of proposals for more substantial service changes in particular regions or on individual routes.

The primary differences between the quarterly service changes and the rolling service plans include:

- Magnitude of service changes considered (as defined below)
- Extent and type of analysis used
- Level of public participation

Quarterly service changes to transit services can be implemented with existing equipment, within the adopted budget, and without significantly affecting route structure or service delivery.

Rolling Service Plan changes have a notable effect on passengers, resource requirements, route structure, or service delivery.

Table 15: Quarterly and Service Plan Changes

Magnitude	Resource Implications	Type
Quarterly	Changes that can be implemented with existing equipment and within the adopted budget	Running time adjustments
		Departure time adjustments
		Headway changes to match ridership and service levels (provided the frequency and comfort minimums are still met)
		Changes to stop locations
		Route alignment changes
		Span of service changes within 1 hour or less
		Route extensions of 1 mile or less
		Route variation modifications
Service Plan	Changes that will have a significant effect on resources, and may potentially have a significant effect on passengers	Major service restructuring
		Implementation of new routes or services
		Elimination of a route or service
		Elimination of part of a route greater than 1 mile
		Span of service changes greater than 1 hour
		Route extensions greater than 1 mile

Source: MBTA.

Initiation of Service Planning Ideas

Service changes may be initiated in a variety of ways, including, but not limited to:

- Service requests and/or comments from the public, including municipalities and organizations through various media (public meetings or workshops, written correspondence, MBTA website, MBTA customer call center, email, Twitter, etc.)
- Proposals made by MBTA staff (Service Planning; Operations staff, such as drivers, inspectors, or garage superintendents)
- Studies completed by regional entities or municipalities

- Gaps identified between provision of MBTA services and performance targets established in this document. If, during the Quarterly or Rolling Service Plan process, a route is found to fall below the minimum on one of the established standards, it should be prioritized.

Quarterly Service Planning Process

The MBTA Service Planning Department screens potential service changes to determine whether they should be evaluated and implemented as part of the Quarterly process or Service Plan process. Potential changes are considered with respect to their impact on Service Delivery Policy standards.

Proposed changes are presented to the Service Committee, which includes representatives of the following departments:

- Service Planning
- Schedules
- Operations
- System-wide Accessibility
- Office of Performance Management and Innovation
- Other departments, as appropriate

Quarterly changes are approved by the Service Committee and implemented within the adopted budget as soon as practical.

Rolling Service Plans Process

Two inputs inform the Service Plan process, which will be performed on a continuous rolling basis in particular areas or on certain routes.

- Current service performance measured against performance targets
- Recommendations for service changes that improve route or network performance

The priorities for the rolling service plan are determined by which service planning standards fall below their minimum level. Depending on the standard, the analysis is done at the network, mode, and/or route level. If the performance level of a mode below the minimum on any standard, that standard must be prioritized. Since there are tradeoffs between standards, allocating resources to address priority standards can impact other standards. After suggested changes, the performance levels on all standards must be re-evaluated to determine if the changes lowered performance on any other standards below the minimum levels (at the route, mode, and/or network

level). Since crowding and reliability can only be measured for operated service, proxy variables can be used to model the impact of the proposed changes.

During the Rolling Service Planning process, the routes are evaluated using the Cost-Benefit Ratio tool corresponding to the most recent data available. Routes that fall below the 10th percentile are flagged for analysis. The tool is used to determine which aspect(s) of the service are driving the low ratio and could be addressed to improve the service, or how the cost could be lowered, up to and including route elimination. Routes that perform at higher than 90th percentile will also be evaluated to consider which aspect(s) may have contributed to extraordinary performance and whether they can be emulated in other services.

The Service Committee recommends service proposals to include in the Preliminary Service Plan. Each Preliminary Service Plan is made available to the public for review and comment. A list of final recommendations are then submitted to the MBTA governing board for approval before the changes are implemented, along with Title VI and environmental justice service equity analyses, if necessary.

As with the Quarterly service planning process, a goal in developing service plans is to ensure that the MBTA uses available resources effectively. However, the rolling planning process also can identify service changes and enhancements that have merit, but which cannot be provided within the existing operating budget. In such cases, additional operating funds may be requested, and the service(s) may be implemented when sufficient resources become available.

With seven bus districts and four heavy rail or light rail districts, the MBTA anticipates that the rolling process will take 2-3 years to complete an entire cycle. The MBTA may consider substantial service changes for a specific route or corridor either individually or grouped with other routes, areas, or bus districts.

Annual Service Evaluation

Once a year, the MBTA will publish a summary report of route and network performance according to the standards included in the Service Delivery Policy. Included in this report will be an analysis of the “gap” between the level of service that the MBTA is currently providing and the levels of service the MBTA would need to provide to reach the performance targets set in the Service Delivery Policy.

The MBTA will quantify gaps and identify potential actions to close the gaps. Options include those internal to the Service Planning process, such as shifting resources to benefit one service or standard over another without dropping below the minimum on any standards. The gap analysis will also consider external measures, such as securing additional operating funds, future capital investments, or more inter-governmental cooperation. Both internal and external measures will give policymakers, MBTA officials, and the public a better sense of the tradeoffs inherent in budget-constrained service

planning and suggest how additional resources could be used to provide service according to Service Delivery Policy performance targets.

Public Participation

Public participation in the general service planning process occurs both on an on-going basis and as part of the Service Plan-specific process. The purpose of public involvement in the service planning process is to promote regular dialogue with existing and potential passengers, elected officials, and communities regarding their service needs.

Public participation is always required for a Service Plan. In addition, specific changes, for example route elimination, require public participation regardless of when the change takes place.

Ongoing Public Outreach

The MBTA provides avenues for ongoing communication through its website, customer phone line, social media outlets, standing committees, and comments sent to individual MBTA officials. Service-related comments and requests are directed to the appropriate department for consideration and response. Upon request, MBTA staff also attend public meetings held by municipalities or with public officials to address specific service issues. From time to time, the MBTA may conduct specific market or route-based meetings to gather direct feedback on potential service changes. This ongoing public outreach informs both the quarterly service planning process and the rolling service plan process.

Rolling Service Plan Public Outreach

Once a Preliminary Service Plan is complete, the MBTA schedules one or more public meetings in appropriate locations. At these open meetings, the MBTA presents the analysis and issues behind the proposed service changes and solicits public comments on them. MBTA staff then assesses and analyzes the suggestions made through the public comments and, as appropriate, incorporates them into the final recommendations that go to the Board of Directors for approval.

All Service Plan public notifications and meetings conform to ADA and Title VI requirements and MBTA policies associated with these laws.

Table 16: Summary of Service Planning Processes

	Quarterly Service Planning Process	Rolling Service Plan Process
Initiation of changes:	Requests/comments from public, including public and non-profit entities Bus Operations feedback Service Planning staff Service studies	Requests/comments from public, including public and non-profit entities Bus Operations feedback Service Planning staff Service studies Public meetings
Evaluation of changes:	Route-level analysis using the evaluation criteria Review by Service Committee	Area or district-level analysis using the evaluation criteria including performance review of all services using service standards Comparative evaluation of proposed service changes and possible new services Review by Service Committee Public review and comment Title VI and Environmental Justice analysis as needed
Implementation of changes:	Quarterly with regular schedule changes	Rolling, upon approval of the Service Plan by the MBTA governing board

Source: MBTA.

Glossary of Terms and Acronyms

ADA: Americans with Disabilities Act of 1990, and as amended in 2008.

Automated Fare Collection (AFC) System: The specific instruments, such as faregates and fareboxes, and back-end infrastructure the MBTA uses to collect fares.

AVL: Automatic Vehicle Locator.

Boston Region MPO: Boston Region Metropolitan Planning Organization. The Boston Region Metropolitan Planning Organization, staffed by CTPS, is responsible for conducting the federally required metropolitan transportation-planning process (often called the 3C—continuing, cooperative, and comprehensive—process) for the Boston metropolitan area. The MPO uses this process to develop a vision for the region, then decides how to allocate federal and state transportation funds to programs and projects—roadway, transit, bicycle, and pedestrian—that support that vision.

Coverage: People living within the geographic area served by the MBTA system.

CTPS: Central Transportation Planning Staff (to the Boston Region MPO).

Dual Mode: Buses that can operate using electrical power from overhead catenary wires or a diesel engine to power the electric traction motors that turn the wheels.

Fixed-Route Service: Services that operate on designated routes with published timetables including all light rail, heavy rail, commuter rail, boat, and bus services. (The RIDE, the MBTA's paratransit service, is not a fixed-route service.)

Frequency of Service: The number of trips per hour provided on a route (for example, a route that operates every 15 minutes has a frequency of four trips per hour).

Headway: The number of minutes between scheduled trips on a route (for example, a route that operates four trips per hour has a 15-minute headway).

Heavy Rail Services: Red Line, Orange Line, and Blue Line.

Key Routes: Key bus routes are similar to local routes, but have policy standards for a longer span and higher frequency of service.

Language Access Plan (LAP): Includes the MBTA's language access needs assessment, based on the US Department of Transportation "four-factor analysis" and it prescribes:

- Methods and measures the MBTA uses to communicate with passengers with limited proficiency in English
- Training programs for educating staff about the Authority's Title VI obligations, including providing accessible services to passengers who are not proficient in English

- Methods the Authority uses to provide notice to the public of the Authority's Title VI obligations, including providing language assistance to passengers who are not proficient in English
- Plans for monitoring and updating the Language Assistance Plan.

Leading Headway: The number of minutes between a trip and the trip before it.

Light Rail Services: Green Line and Mattapan High Speed Line.

Limited English Proficiency (LEP): Individuals who have a limited ability to read, write, speak, or understand English are limited English proficient, or 'LEP. According to the American Community Survey (ACS), those who indicated they spoke English "well," "not well," or "not at all" were considered to have difficulty with English—identified also as people who speak English "less than very well."

MPO: Metropolitan Planning Organization.

Paratransit: A transit mode operating with flexible schedules and without fixed routes. Generally, paratransit operators use cars, vans, or small buses to serve passengers. The MBTA's ADA paratransit service is known as The RIDE.

Peak Direction: The direction in which most commuters are traveling on a route during the peak period (for example, toward Boston in the morning and away from Boston in the afternoon).

Public Participation Plan: The Public Participation Plan, or PPP, serves to guide agency public participation efforts, including populations that have been underserved by the transportation system and/or have lacked access to the process. The PPP guides in its efforts to offer early, continuous, and meaningful opportunities for the public to help identify social, economic, and environmental impacts of proposed transportation policies, projects and initiatives across MassDOT/MBTA.

Schedule Adherence: An indication of on-time performance, or how reliably services adhere to published schedules. Schedule adherence is the service standard that is used to measure progress toward achieving the reliability service objective.

Shared Segment: A portion of the bus network that is used by multiple bus routes.

Span of Service: Refers to the hours during which service is accessible and is defined by the times that a service begins in the morning and ends in the evening. Span of Service is one of the service standards that are used to measure progress toward achieving the availability service objective.

Timepoint: A bus stop for which the MBTA lists the scheduled arrival time on its schedules. Timepoints are frequently found at major intersections along a route. There is neither a set distance between timepoints nor a specific number of timepoints for a route.

Timepoint Crossing: The act of passing a timepoint.

Title VI: Title VI of the Civil Rights Act of 1964 requires that transit agencies that receive federal funding demonstrate that they do not discriminate based on race, color, or national origin in providing services.

Vehicle Load: Defines the level of passenger crowding that is acceptable for a safe and comfortable ride. Vehicle Load is expressed as a ratio of the number of passengers on the vehicle to the number of seats on the vehicle. Vehicle load is used to calculate the service standard for measuring progress toward achieving the comfort service objectives.

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Appendix A: Route Types

Table A1: Local Bus Routes

7	City Point – Otis and Summer Streets
8	Harbor Point /U Mass – Kenmore Station
9	City Point – Copley Square via Broadway Station
10	City Point – Copley Square Via BU Med Center
11	City Point – Downtown
14	Roslindale Square – Heath Street Loop
16	Forest Hills Station – U Mass. Or Andrew Station
17	Fields Corner Station – Andrew Station
18	Ashmont Station – Andrew Station
19	Fields Corner Station – Ruggles or Kenmore Station
21	Ashmont Station – Forest Hills Station
24	Wakefield Ave. – Mattapan Station or Ashmont
26	Ashmont Station – Norfolk and Morton Belt Line
27	Mattapan Station – Ashmont Station
29	Mattapan Station – Jackson Square or Ruggles
30	Mattapan Station – Forest Hills Station
31	Mattapan Station – Forest Hills Station
33	River and Milton Streets – Mattapan Station
34/34E	Walpole Center or Dedham Line – Forest Hills Station
35	Dedham Mall – Forest Hills Station
36	VA Hospital – Forest Hills Station Via Chas. River Loop
37	Baker and Vermont Streets – Forest Hills Station
38	Wren Street – Forest Hills Station
40	Georgetowne – Forest Hills Station
41	Centre and Eliot Streets – JFK U Mass Station
42	Forest Hills Station – Dudley or Ruggles Station
43	Ruggles Station – Park and Tremont Streets
44	Jackson Square Station – Ruggles Station
45	Franklin Park – Ruggles Station
47	Central Square Cambridge. – Broadway Station
50	Cleary Square – Forest Hills Station Via Metropolitan
51	Reservoir – Forest Hills Station
52	Dedham Mall – Watertown Yard
55	Queensberry Street – Park and Tremont Streets
59	Needham Junction – Watertown Square
60	Chestnut Hill Station – Kenmore Station
62	Bedford V.A. Hospital – Alewife Station
64	Oak Square – University Pk. Cambridge
65	Brighton Center – Kenmore Station
67	Turkey Hill – Alewife Station
68	Harvard Square – Kendall MIT Station
69	Harvard Square – Lechmere Station
70/70A	Cedarwood – Central Square Cambridge
72	Aberdeen and Mt. Auburn – Harvard Station
74	Belmont Center – Harvard Station via Concord Ave
75	Belmont Center – Harvard Station via Fresh Pond Pkwy
76	Hanscom Air Force Base – Alewife Station
78	Arlmont Village – Harvard Station
79	Arlington Heights – Alewife Station
80	Arlington Center – Lechmere Station
83	Rindge Ave. – Central Square, Cambridge
85	Spring Hill – Kendall MIT Station
86	Sullivan Station – Reservoir Station

87	Arlington Center or Clarendon Hill – Lechmere Station via Somerville Avenue
88	Clarendon Hill – Lechmere Station via Highland Avenue
89	Clarendon Hill or Davis Square – Sullivan Station via Broadway
90	Davis Square Station – Wellington Station
91	Sullivan Station – Central Square, Cambridge
92	Assembly Square Mall – Downtown Via Main Street
93	Sullivan Station – Downtown Via Bunker Hill
94	Medford Square – Davis Square Station
95	West Medford – Sullivan Station
96	Medford Square – Harvard Station
97	Malden Station – Wellington Station
99	Boston Reg. Med Center Stoneham – Wellington Station
100	Elm Street – Wellington Station
101	Malden Station – Sullivan Station Via Medford Square
104	Malden Station – Sullivan Station Via Ferry Street
105	Malden Station – Sullivan Station Via Main Street
106	Franklin Square or Lebanon Street Loop – Wellington Station
108	Linden Square – Wellington Station
109	Linden Square – Sullivan Station
110	Wonderland Station – Wellington Station
112	Wellington Station – Wood Island Station
119	Northgate Shopping Center – Beachmont Station
120	Orient Heights Station – Maverick Station
132	Redstone Shopping Center – Malden Station
134	North Woburn – Wellington Station
136	Reading Depot – Malden Station Via Lowell St
137	Reading Depot – Malden Station Via North Ave
201/202	Fields Corner Station – Fields Corner Station
210	Quincy Center Station – No. Quincy Station or Fields Corner Station
211	Quincy Center Station – Squantum
214	Quincy Center Station – Germantown
215	Quincy Center Station – Ashmont Station
216	Quincy Center Station – Houghs Neck
220	Quincy Center Station – Hingham
222	Quincy Center Station – East Weymouth
225	Quincy Center Station – Weymouth Landing or Columbian Square
230	Quincy Center Station – Montello Station
236	Quincy Center Station – South Shore Plaza
238	Quincy Center Station – Holbrook/Randolph Comm. Rail St
240	Avon Line – Ashmont Station
245	Quincy Center Station – Mattapan Station
350	North Burlington – Alewife Station
411	Malden Station – Revere/Jack Satter House
426	Central Square Lynn – Haymarket or Wonderland Station Via Cliftondale Square **(Partially Express)**
429	Northgate Shopping Center – Central Square Lynn
430	Malden Center Station – Saugus Center via Square One Mall
435	Liberty Tree Mall – Central Square Lynn
436	Liberty Tree Mall – Central Square Lynn
441	Marblehead – Haymarket or Wonderland Station via Paradise Rd.
442	Marblehead – Haymarket or Wonderland Station via Humphry St.
450	Salem Depot – Haymarket or Wonderland Station via Western Ave **(Partially Express)**
455	Salem Depot – Wonderland Station
456	Salem Depot – Central Square Lynn
465	Danvers Square – Salem Depot
553	Roberts – Downtown Boston **(Partially Express)**
554	Waverley Square – Downtown Boston **(Partially Express)**
CT1 (701)	Central Square Cambridge. – B.U. Medical Campus/Boston Medical Ctr. Via MIT
CT2 (747)	Sullivan Station – Ruggles Station via Union Square Kendall/MIT and Longwood Medical Area
CT3 (708)	Beth Israel Deaconess or B.U. Medical Campus – Andrew Station

Private Carrier Local Bus Routes

710	North Medford – Medford Square Meadow Glen Mall or Wellington Station
712/713	Point Shirley, Winthrop – Orient Heights
714	Pemberton Pt., Hull – Station St., Hingham
716	Cobbs Corner – Mattapan Station via Canton Center

Table A2: Key Bus Routes

1	Harvard Square – Dudley Station via Mass. Ave.
15	Kane Square or Fields Corner – Ruggles Station
22	Ashmont Station – Ruggles Station Via Talbot Ave
23	Ashmont Station – Ruggles Station via Washington Street
28	Mattapan Station – Ruggles Station
32	Wolcott Square or Cleary Square – Forest Hills Station
39	Forest Hills Station – Back Bay Station
57/57A	Watertown Yard – Kenmore Station
66	Harvard Square – Dudley Station via Brookline
71	Watertown Square – Harvard Station
73	Waverley Square – Harvard Station
77	Arlington Heights – Harvard Station
111	Woodlawn or Byway and Park – Haymarket Station
116	Wonderland Station – Maverick Station Via Revere (in combination with 117)
117	Wonderland Station – Maverick Station via Beach (in combination with 116)
SL1 (741)	Logan Airport – South Station
SL2 (742)	Boston Design Center – South Station
SL4 (751)	Dudley Station – South Station
SL5 (749)	Dudley Station – Downtown

Table A3: Commuter Bus Routes

4	North Station – Tide Street
84	Arlmont Loop – Alewife Station
121	Wood Island Station – Maverick Station
131	Melrose Highlands – Malden Station
170	Waltham – Dudley Station (Limited Service) **(Express)**
212	Quincy Center Station – North Quincy Station
217	Quincy Center Station – Ashmont Station
221	Quincy Center Station – Fort Point
325	Elm Street – Haymarket Station **(Express)**
326	West Medford – Haymarket Station **(Express)**
351	EMD Serono/Bedford Woods – Alewife Station **(Express)**
352	Burlington – State Street **(Express)**
354	Woburn Line – State Street **(Express)**
424	Eastern and Essex – Haymarket or Wonderland **(Express)**
428	Oaklandvale – Haymarket Station via Granada Highlands
434	Peabody Square – Haymarket Station via Goodwins Circle **(Express)**
439	Bass Point Nahant – Central Square Lynn
448	Marblehead – Downtown Crossing **(Express)**
449	Marblehead – Downtown Crossing **(Express)**
451	North Beverly – Salem Depot
459	Salem Depot – Downtown Crossing **(Express)**
501	Brighton Center – Downtown Boston **(Express)**
502	Watertown Yard – Copley Square **(Express)**
503	Brighton Center – Copley
504	Watertown Yard – Downtown Boston **(Express)**
505	Waltham Center – Downtown Boston **(Express)**
556	Waltham Highlands – Downtown Boston **(Express)**
558	Auburndale – Downtown Boston **(Express)**

Table A4: Community Bus Routes

5	City Point – McCormack Housing

Table A5: Supplemental Bus Routes

114	Bellingham Square – Maverick Station
171	Dudley Station – Logan Airport via Andrew Station
191	Mattapan – Haymarket via Ashmont, Fields Corner and Dudley Station
192	Cleary Square – Haymarket via Forest Hills and Copley Square
193	Watertown Yard – Haymarket via Kenmore Station
194	Clarendon Hill – Haymarket via Sullivan Square Station
195	Shattuck Hospital – Temple Place
SLW (746)	Silver Line Way – South Station
9701	Cambridge Street at Warren Street – Ruggles Station
9702	Cambridge Street at Warren Street – Andrew Station
9703	Cambridge Street at Warren Street – Jackson Station

Appendix B: Vehicle Load

Table B1: Bus and Trackless Trolley

Vehicle Type	No. of Seats	Off-Peak Standard	Off-Peak Max Load	Peak Load Standard	Peak Max Load
RTS 40' Diesel	40	125%	50	140%	56
New Flyer 40' Emission Contr. Diesel	39	125%	48	140%	55
New Flyer 40' Compressed Natural Gas	39	125%	48	140%	55
New Flyer 40' XDE40	37	125%	46	140%	52
NABI 40' Compressed Natural Gas	39	125%	48	140%	55
Neoplan 40" Emission Controlled Diesel	38	125%	47	140%	53
Neoplan 40' Electric Trolley Bus	31	140%	43	140%	43
New Flyer 60' Diesel-Electric Hybrid	57	125%	71	140%	80
Neoplan 60' Compressed Natural Gas	57	125%	71	140%	80
Neoplan 60' Dual-Mode Articulated	47	140%	66	140%	66
Neoplan 60' Airport Dual-Mode Artic.	38	140%	53	140%	53

Note: Dual-mode vehicles used in Silver Line tunnels and electric trolley buses are always evaluated using the Peak Load Standard because of the operating characteristics of that service and because those vehicles have more standing room per seat.

Source: MBTA.

Table B2: Vehicle Load on Light Rail, Heavy Rail, Silver Line Waterfront

			Total Passengers			
Vehicle Type	No. of Seats	Floor Area (sq. ft.)	Early AM/ AM Peak	Midday Base	Midday School/ PM Peak	Evenings and Weekends
Green Line 7/8	46/44	207	100	66	100	66
Mattapan Line	41	120	73	53	73	53
Red Line 1	63	306	165	94	165	94
Red Line 2	62	297	161	92	161	92
Red Line 3	50	338	163	84	163	84
Orange Line	58	249	141	83	141	83
Blue Line	35	154	86	50	86	50

Source: MBTA.

Table B3: Commuter Rail

Vehicle Type	Fleet ID	Number of Seats	Peak Load Standard	Peak Max Load
Pullman	200–258	114	110%	125
Bombardier	350–389	127	110%	140
Bombardier	600–653	122	110%	134
Bombardier	1600–1652	122	110%	134
Kawasaki	700–749	185	110%	204
Kawasaki	750–781	182	110%	200
Kawasaki	900–932	178	110%	196
Kawasaki	1700–1724	175	110%	193
MBB	500–532	94	110%	103
MBB	1500–1533	96	110%	106
Rotem	800–846	179	110%	197
Rotem	1800–1827	173	110%	190

Source: MBTA.

Table B4: Commuter Boat (MBTA-Owned)

Vessel Name	Vessel Type	Max Load
Flying Cloud	Catamaran	149
Lightning	Catamaran	149

Source: MBTA.

Appendix C: The RIDE Service Standards

The MBTA monitors The RIDE contractors using performance metrics. If a contractor fails to meet standards set in the contracts, as well as FTA ADA requirements, they incur monetary penalties.

These metrics include:

Reliability

Missed trips (service provider at fault)
Vehicle does not show or is more than 30 minutes late.

Late trips (service provider at fault):
Pick up is more than 15 minutes late and/or drop-off is more than 10 minutes after appointment time.

Not Available trips (service provider at fault)

No Show/Late Cancellation trips (customer at fault)

Travel time
Total registered trips that violate travel time standards should not exceed 2% of all registered trips.

Percent of registered trips assigned to non-dedicated vehicles
Total registered trips assigned to non-dedicated vehicles should not exceed 5% of all registered trips, unless the Contractor has received prior approval to do so by the MBTA.

Complaint rates
The number of complaints concerning The RIDE should not exceed 0.2% of the trips requested.

Accident rates (At fault/not at fault)
All incidents and accidents should be reported.

Accessibility

Lift or ramp failures
Ramps should be operable.

Comfort

Air Conditioning/heating failures

Air conditioners and heaters should be operable.

Communication

Telephone communication system failures

The telephone communication system should be operable. The MBTA levies penalties for interruptions in excess of 30 minutes.

Vehicle communication system failures

The vehicle communication system should be operable. The MBTA levies penalties for interruptions in excess of 60 minutes. Any occurrence of <90% functionality of these systems for all vehicles deployed in service shall also constitute a failure/ interruption.

Computer system disruptions

The computer systems used in the delivery of services (reservations, scheduling, dispatching, reporting) should be operable. The MBTA levies penalties for interruptions in excess of 60 minutes.

Telephone hold time

The average hold time is over 1.5 minutes and/or where 5% of the total calls have a hold time that exceeds 5 minutes.

Staff uniform policy violations

Staff should abide by the uniform policy.

Failure to respond to complaints

Complaints should be responded to within 10 days.

Management and Staffing

Key senior staff vacancies

Vacancies in one of the eight “key senior staff” positions should not last longer than 60 calendar days.

Personnel complement compliance

Each month, 100% of the proposed complement of personnel for each position should maintained.

Appendix D: Service Standard Minimums and Targets

Table D1: All Service Standards

Standard	Minimum	Target	2016 performance	2016 data
Span of Service Standards (minimums, targets, and 2016 performance apply to weekdays only)				
Bus	90%	95%	93%	Spring 2016
Heavy Rail	—	100%	100%	Dec 2016
Light Rail	—	100%	100%	Dec 2016
Commuter Rail	—	100%	100%	Dec 2016
Boat	—	100%	100%	Dec 2016
Service Frequency Standards (minimums, targets, and 2016 performance apply to weekdays only)				
Bus	90%	95%	90%	Spring 2016
Rapid Transit	—	100%	100%	Dec 2016
Boat	—	100%	100%	Dec 2016
Coverage Standards				
Base	75%	—	80%	Fall 2016
Frequent service in dense areas	—	85%	80%	Fall 2016
Low-income households	—	85%	83%	Fall 2016

Table D1 continues on next page

Table D1: All Service Standards, continued

Standard	Minimum	Target	2016 performance	2016 data
Accessibility Standards				
Platform Accessibility (Rapid Transit, gated stations)	92%	100%	92%	Apr 2015–Mar 2016
Vehicle Accessibility (Green Line)	98.6%	100%	98.6%	Jul 2015–Jun 2016
Reliability Standards				
Bus Reliability (non-Key)	70%	75%	65%	Mar–Dec 2016
Key Bus Reliability	75%	80%		
Rapid Transit Passenger Wait Times	—	90%	89%	Mar–Dec 2016
Commuter Rail Reliability	Contract requires 92% (adjusted)		93.8% (adjusted)	Jan–Dec 2016
Boat Reliability	—	99%	98%	Jul 2015–Jun 2016
Bus Service Operated	—	99.5%	98.5%	Jul 2015–Jun 2016
Light Rail Service Operated	—	99.5%	96.5%*	Mar–Dec 2016
Heavy Rail Service Operated	—	99.5%	99.1%*	Mar–Dec 2016
Commuter Rail Service Operated	Contract sets fines for canceled service		99.8%	Jan–Dec 2016
Passenger Comfort Standards				
Bus Passenger Minutes in Comfortable Conditions	92%	96%	94%	Weekdays, Sep–Dec 2015

* Data subject to change with improvements in data collection methodologies